WHAT IS CLAIMED IS:

1. A muscle fatigue level measuring device comprising:
impedance component measuring means,
5   muscular tissue effective length measuring means
biologically equivalent model parameter computation means, and
muscle fatigue level determination means,
wherein
the impedance component measuring means measures a resistance
10   component and a reactance component in a body part as impedance
in the body part,
the muscular tissue effective length measuring means measures
a muscular tissue effective length in the body part,
the biologically equivalent model parameter computation means
15   computes biologically equivalent model parameters including
extracellular fluid resistivity and distribution membrane
capacitance based on the resistance component and reactance
component measured by the impedance component measuring means
and the muscular tissue effective length measured by the
20   muscular tissue effective length measuring means, and
the muscle fatigue level determination means determines a
muscle fatigue level based on the ratio between the
extracellular fluid resistivity and distribution membrane
capacitance computed by the biologically equivalent model
25   parameter computation means.

2. The device of claim 1, wherein the impedance component
measuring means comprises:

current supply means,

voltage measuring means, and

impedance component computation means,

wherein

5   the current supply means supplies alternating currents of

multiple frequencies to a body part,

the voltage measuring means measures voltages generated in the

body part by supplying the alternating currents of multiple

frequencies by the current supply means, and

10   the impedance component computation means computes resistance

components and reactance components in the body part by dividing

the voltages measured by the voltage measuring means by the

currents supplied from the current supply means.

15   3.   The device of claim 2, wherein the alternating

currents of multiple frequencies are an alternating current

with a frequency of 50 kHz and an alternating current with a

frequency of 6.25 kHz.

20   4.   The device of claim 1, wherein the muscular tissue

effective length measuring means comprises:

part length measuring means,

part width measuring means, and

muscular tissue effective length computation means,

25   wherein

the part length measuring means measures a part length in the

body part,

the part width measuring means measures a part width in the body

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part, and

the muscular tissue effective length computation means computes

the muscular tissue effective length in the body part based on

the part length measured by the part length measuring means and

5   the part width measured by the part width measuring means.

5.   The device of claim 2, wherein the muscular tissue

effective length measuring means comprises:

part length measuring means,

10   part width measuring means, and

muscular tissue effective length computation means,

wherein

the part length measuring means measures a part length in the

body part,

15   the part width measuring means measures a part width in the body

part, and

the muscular tissue effective length computation means computes

the muscular tissue effective length in the body part based on

the part length measured by the part length measuring means and

20   the part width measured by the part width measuring means.

6.   The device of claim 3, wherein the muscular tissue

effective length measuring means comprises:

part length measuring means,

25   part width measuring means, and

muscular tissue effective length computation means,

wherein

the part length measuring means measures a part length in the

body part,

the part width measuring means measures a part width in the body
part, and

the muscular tissue effective length computation means computes

5   the muscular tissue effective length in the body part based on
the part length measured by the part length measuring means and
the part width measured by the part width measuring means.

7.   The device of claim 4, wherein the muscular tissue

10 effective length computation means computes the muscular tissue
effective length by use of the following expression:

$$Meff = k \sqrt{Ml^2 \times Mw^2}$$

wherein Meff represents the muscular tissue effective length,
Ml represents the part length, Mw represents the part width,

15 and k represents a correction coefficient.

8.   The device of claim 5, wherein the muscular tissue
effective length computation means computes the muscular tissue
effective length by use of the following expression:

20      $$Meff = k \sqrt{Ml^2 \times Mw^2}$$

wherein Meff represents the muscular tissue effective length,
Ml represents the part length, Mw represents the part width,
and k represents a correction coefficient.

25   9.   The device of claim 6, wherein the muscular tissue
effective length computation means computes the muscular tissue
effective length by use of the following expression:

$$Meff = k \sqrt{Ml^2 \times Mw^2}$$

wherein Meff represents the muscular tissue effective length, Ml represents the part length, Mw represents the part width, and k represents a correction coefficient.

5   10.   The device of any one of claims 1 to 9, wherein the biologically equivalent model parameter computation means computes extracellular fluid resistivity, intracellular fluid resistivity and distribution membrane capacitance as biologically equivalent model parameters by use of the

10   following expressions:

$$(R + jX)/Meff = \rho r + j\rho x$$

wherein R represents the resistance component, jX represents the reactance component, Meff represents the muscular tissue effective length, and ρr and $j\rho x$ represent a real part and

15   imaginary part of complex resistivity, respectively,

$$1/(\rho r + j\rho x) = 1/Re + 1/(Ri + j \times 2\pi \times f \times Cm)$$

wherein Re represents the extracellular fluid resistivity, Ri represents the intracellular fluid resistivity, Cm represents the distribution membrane capacitance, f represents a measuring

20   frequency, j represents an imaginary number, and π represents a pi.

11.   The device of any one of claims 1 to 9, wherein the muscle fatigue level determination means computes the muscle

25   fatigue level by dividing the extracellular fluid resistivity by the distribution membrane capacitance.

12.   The device of claim 10, wherein the muscle fatigue

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level determination means computes the muscle fatigue level by
dividing the extracellular fluid resistivity by the
distribution membrane capacitance.

13. The device of claim 11, wherein the muscle fatigue
level determination means further computes a more accurate
muscle fatigue level by considering at least one of personal
data including a body weight, a body height, age and sex in
addition to the computed muscle fatigue level.

14. The device of claim 12, wherein the muscle fatigue
level determination means further computes a more accurate
muscle fatigue level by considering at least one of personal
data including a body weight, a body height, age and sex in
addition to the computed muscle fatigue level.

15. The device of claim 1, comprising:
a main body,
first ranging portions,
second ranging portions, and
electrode sets,
wherein
the main body serves as a base,
the first ranging portions are disposed on the main body such
that they can slide freely in a part width direction in a body
part so as to measure a part width,
the second ranging portions are disposed on the first ranging
portions such that they can slide freely in a part length

direction in the body part so as to measure a part length, and
the electrode sets comprise current-carrying electrodes and
measuring electrodes which are disposed at positions on the
second ranging portions which correspond to the part length,
5   the impedance component measuring means includes the electrode
sets and measures a resistance component and a reactance
component in a body part which is in direct contact with the
electrode sets as impedance in the body part, and
the muscular tissue effective length measuring means computes
10   a muscular tissue effective length in the body part based on
the part width measured by the first ranging portions and the
part length measured by the second ranging portions.

16.   The device of claim 15, wherein the electrode sets
15   are disposed at the positions on the second ranging portions
which correspond to the part length via flexible, elastic
members.